IN THE CLAIMS:

Kindly amend claims 3 and 4 as shown in the following listing of claims, which replaces all previous versions and listings of claims in this application.

1. (previously presented) A disturbance estimated-type control system comprising:

a control object based on a mathematical model comprised of one of a state equation and a transfer function and prepared by system identification technology;

disturbance estimating means based on an expansion system based on the mathematical model for estimating a disturbance of the control object in accordance with an input signal inputted into the control object and a detection signal detected from the control object;

compensating means based on the mathematical model for compensating for a deviation between the detection signal and a target value and for outputting a corresponding control signal; and

subtracting means for subtracting the control signal of the compensating means from a disturbance estimated value of the disturbance estimating means.

2. (previously presented) A gas compressor control system comprising:

a variable displacement type gas compressor having a compression chamber and displacement altering means for altering a displacement of gas in the compression chamber and being based on a mathematical model comprised of one of a state equation and a transfer function and prepared by system identification technology;

input means for inputting an input signal into the displacement altering means;

detecting means for detecting a detection signal corresponding to one of ambient air temperature, air temperature at an outlet of an evaporator, a flow of a refrigerant flowing through the variable displacement type gas compressor, and a pressure of the refrigerant on a suction side of the compressing chamber;

disturbance estimating means based on an expansion system based on the mathematical model for estimating a disturbance of the variable displacement type gas compressor in accordance with the detection signal detected by the detecting means and the input signal input into the displacement altering means;

compensating means based on the mathematical model for compensating for a deviation between the detection signal and a target value and for outputting a corresponding control signal; and

subtracting means for subtracting the control signal of the compensating means from a disturbance estimated value of the disturbance estimating means.

3. (currently amended) A method of designing a disturbance estimated-type control system, comprising the steps of:

providing a control object;

preparing a mathematical model of the control object ~~utilizing system identification technology, the~~ by inputting a control signal into the control object, measuring an output signal from the control object resulting from the control signal inputted into the control object, and performing, based on the output signal, identification with an identification program to establish an evaluation, the mathematical model comprising one of a state equation and a transfer function;

providing an expanded state equation based on the mathematical model of the control object and a mathematical model of a disturbance;

designing from the expanded state equation a disturbance estimating device for estimating a disturbance of the control object in accordance with an input signal inputted into the control object and a detection signal detected from the control object;

designing from the mathematical model of the control object a compensating device for compensating for a deviation between the detection signal and a target value and for outputting a control signal; and

subtracting the control signal of the compensating device from a disturbance estimated value of the disturbance estimating device.

4. (currently amended) A method of designing a disturbance estimated-type control system, comprising the steps of:

providing a control object;

preparing a mathematical model of the control object by inputting a control signal into the control object, measuring an output signal from the control object resulting from the control signal inputted into the control object, and performing, based on the output signal, identification with an identification program to establish an evaluation;

providing an expanded state equation based on the mathematical model of the control object and a mathematical model of a disturbance;

designing from the expanded state equation a disturbance estimating device for estimating the disturbance of the control object in accordance with an input signal inputted into the control object and a detection signal detected from the control object;

designing from the mathematical model of the control object a compensating device for compensating for a deviation between the detection signal and a target value and for outputting a control signal;

subtracting the control signal of the compensating device from a disturbance estimated value of the disturbance estimating device; and

determining whether or not the expanded state equation is observable and, if it is determined to be unobservable, compulsorily adding an error of 10% or less to a coefficient corresponding to an A matrix and/or a C matrix of the expanded state equation or to a zero-th dimension term of a transfer function numerator of the mathematical model of the control object and preparing an expansion system including the error to thereby establish observability.

5. (canceled).

6. (previously presented) A gas compressor control system according to claim 2; wherein the disturbance of the variable displacement type gas compressor comprises a variation in the number of rotations of the variable displacement type gas compressor.

7. (canceled).

8. (previously presented) A disturbance estimated-type control system according to claim 1; wherein the control object comprises a variable displacement-type gas compressor.

9. (previously presented) A disturbance estimated-type control system according to claim 8; wherein the variable displacement-type gas compressor comprises a compression chamber; and wherein the detection signal comprises one of an air temperature at an outlet of an evaporator and a refrigerant pressure on a suction side of the compression chamber.